

[Start](#) | [Grid View](#) | [Author Index](#) | [View Uploaded Presentations](#) | [Meeting Information](#)

## Rocky Mountain Section - 72nd Annual Meeting - 2020

Paper No. 20-5

Presentation Time: 3:05 PM

### WHAT CONTROLS STREAM DYNAMICS IN NORTHERN YELLOWSTONE NATIONAL PARK?

**PERSICO, Lyman P.**<sup>1</sup>, FOKY, Trent<sup>1</sup>, HINZMANN, Alice<sup>2</sup>, IOSSO, Chantal<sup>3</sup>, PHINNEY, April I.<sup>4</sup> and VAN WETTER, Eliza<sup>5</sup>,  
(1)Department of Geology, Whitman College, 345 Boyer Ave, Walla Walla, WA 99362, (2)Department of Geology, Carleton College, 300 North College Street, Northfield, MN 55057, (3)Department of Geology, Washington and Lee University, 204 W Washington Street, Lexington, VA 24450, (4)Department of Geology and Environmental Science, Wheaton College, 501 College Avenue, Wheaton, IL 60187, (5)Department of Geology, Whitman College, 280 Boyer Ave, Walla Walla, WA 99362

Riparian corridors are key ecological zones in the semiarid Northern Range of Yellowstone National Park. The removal of wolves in the early 20<sup>th</sup> century may have transitioned Northern Range streams from a stable beaver-willow ecosystem to an unstable elk-grassland ecosystem by way of a trophic cascade. Some research suggests that wolf extirpation increased ungulate herbivory, decreased riparian vegetation, decreased beaver damming, and initiated unprecedented channel incision. To assess stream variability during the historical period, it is necessary to quantify baseline natural stream variability during the Holocene. Along small streams in the Northern Range (basin areas <75 km<sup>2</sup>), valley floor sediments include up to 2.5 m of fine-grained organic-rich beaver pond sediments, berms (abandoned dams) on flood plains and terraces, and stream meanders forced by relict dams. Radiocarbon ages indicate long-term deposition rates of 0.5-6.0 mm yr<sup>-1</sup> for beaver-pond deposits, and modest net aggradation during the late Holocene (0-4 ka). On Blacktail Deer Creek, beaver pond deposits are inset in terrace/fan deposits that are unrelated to beaver damming. These deposits are fine-grained, contain minimal organic material, and have well-developed, thick A horizons. Radiocarbon dates and an ash layer associated with an eruption of Glacier Peak (11.2 ka) indicate deposition during the early and middle Holocene. Aggradation may be related to a drier climate in the early Holocene compounded by high rates of paraglacial sedimentation in the recently deglaciated landscape. The larger Gardner River preserves beaver pond sediments that are 0.5-1.5 m thick, and sedimentation rates (0.2-3.4 mm yr<sup>-1</sup>) are less than on smaller streams. Pond sediments are preserved in late Holocene terraces with intervening episodes of incision that coincide with drought. Despite beaver activity, net incision of 1.5 m occurred over the late Holocene. The fluvial geomorphic record suggests that Northern Range stream aggradation and degradation events are not exclusively controlled by historic trophic cascade-related factors. Natural variability and geomorphic history, in part driven by Holocene climate fluctuations, are important controls on stream morphology.

Session No. 20

[T13. Geomorphic and Paleoclimate Records from the Intermountain West](#)

Tuesday, 5 May 2020: 1:25 PM-4:30 PM

Cascades E (Utah Valley Convention Center)

Geological Society of America *Abstracts with Programs*. Vol. 52, No. 3  
doi: 10.1130/abs/2020RM-346807

© Copyright 2020 The Geological Society of America (GSA), all rights reserved. Permission is hereby granted to the author(s) of this abstract to reproduce and distribute it freely, for noncommercial purposes. Permission is hereby granted to any individual scientist to download a single copy of this electronic file and reproduce up to 20 paper copies for noncommercial purposes advancing science and education, including classroom use, providing all reproductions include the complete content shown here, including the author information. All other forms of reproduction and/or transmittal are prohibited without written permission from GSA Copyright Permissions.

[Back to: T13. Geomorphic and Paleoclimate Records from the Intermountain West](#)

[<< Previous Abstract](#) | [Next Abstract >>](#)